

DD/S 61-8845

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18 OCT 1961

MEMORANDUM FOR: Deputy Director (Support)

SUBJECT: Agency Helicopter Service Within the Washington Area

1. This memorandum is for information only. It describes possible courses of action in establishing a helicopter service for the Central Intelligence Agency in the Washington area. The information presented will aid in determining the feasibility of utilizing this method of transportation for expeditious local movement of Agency officials.

2. The military services provide helicopter transportation to Government agencies in the Washington area. Under the present system, all agencies share the available airlift under an established priority system. Military helicopters can be reserved for the exclusive use of the Central Intelligence Agency through application to the controlling service. Attachment 1 contains specific information.

3. Limited commercial helicopter transportation is available. This service can be arranged on a flight-by-flight basis or through contract for longer specified periods of time. Immediate Agency utilization of commercial service is severely restricted by the lack of established landing sites near areas of Agency interest. Attachment 2 gives detailed data.

4. Through prior agreement with controlling authorities, helicopter landings can be made at established military and civilian airports in the local area. By obtaining clearance for each flight, the Pentagon heliport can be utilized. There are additional potential sites such as the new CIA headquarters, the White House, the Naval Weapons Plant, the commercial heliport at 26th and G Streets, N. W., and Potomac Park (Soccer Field - Ohio Drive). Possible use of the Potomac Park site has not been cleared with the Director of the National Park Service. None of the landing areas mentioned can be utilized prior to obtaining clearance for routes and procedures from the Federal Aviation Agency. Coordination with cleared contacts in FAA on 13 October 1961 determined that routes and procedures can be developed without difficulty. Attachment 3 outlines possibilities and limitations.

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SUBJECT: Agency Helicopter Service Within the Washington Area

5. Customer costs for military helicopter service range from \$45.00 per hour for two-passenger aircraft to \$180.00 per hour for 18-passenger aircraft. Commercial charge for the two-passenger aircraft is approximately \$66.00 per hour. Larger aircraft are not presently available commercially. Attachment 4 is a detailed cost breakdown.

6. Upon determination of the number of daily trips and the general requirements for helicopter service, there appears to be three alternatives from which selection can be made:

a. Military helicopters and pilots may be secured and assigned to a nearby military installation for the exclusive use of the Agency.



c. Commercial service may be obtained with the probability that flights to the White House will have to be handled by the Executive Helicopter Company at Davison Army Air Field.

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JAMES A. GARRISON
Director of Logistics

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Attachments:

1. Availability of Military Aircraft
2. Availability of Commercial Aircraft
3. Potential Landing Sites
4. Comparative Customer Costs

TAB

ATTACHMENT 1

AVAILABILITY OF MILITARY AIRCRAFT

1. All three military services presently provide helicopter transportation in the Washington area. The Air Force has an extremely limited helicopter capability. Only six aircraft are assigned to the helicopter detachment at Bolling Air Force Base. These aircraft are used primarily for Air Force passengers and courier runs.

2. The primary responsibility for providing helicopter service to Government agencies in the Washington area has been assigned to the Department of the Army and to the Marine Corps. Helicopters of these services are assigned to the Executive Helicopter Company at Davison Army Air Field, Fort Belvoir.

3. Army and Marine helicopter service to all Government agencies is governed by the provisions of Department of the Army memorandum 59-2 dated 4 November 1959 (attached). The Air Force directive is almost identical. In addition to the helicopter service available to the President at all times, flights are provided on a priority basis as set forth in the cited memorandum:

a. First Priority - Emergency or humanitarian missions and flights related to disaster or implementing emergency plans.

b. Second Priority - Flights for the White House staff, general officers, and civilian officials or civil service personnel in grade GS-16 or higher sponsored by military establishments in the Washington area.

c. Third Priority - Present air transportation flights not included in a. or b. above, to include flights by Army aviators combining official business with combat readiness training.

d. Fourth Priority - All other flights.

4. It has been determined that helicopters reserved for the exclusive use of the Central Intelligence Agency may be obtained through the following procedures:

a. For Department of Army and Marine Corps aircraft, address a written request (with justification) to the Deputy Chief of Staff for Logistics, Department of the Army. This request, if approved, will be forwarded to Headquarters, United States Continental Army Command (CONARC) for execution. Aircraft and pilots will be stationed at Davison Army Air Field. These aircraft will be maintained by the military service concerned.

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Maintenance facilities at Davison are complete.

b. For Department of Air Force aircraft, address a written request (with justification) to Chief of Staff, U. S. Air Force. Aircraft will be stationed at Bolling Air Force Base. Helicopter maintenance facilities are minimal at Bolling.

Note: To assure continuous helicopter service, two aircraft must be reserved. An average in-service factor of 54% has been established from experience data. Aircraft maintenance requires the remaining 46%.

*Memo 59-2

MEMORANDUM
No. 59-2

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington 25, D. C., 4 November 1959

AIR TRANSPORTATION

U. S. ARMY AIRCRAFT TRANSPORTATION PRIORITIES AND PROCEDURES

	Paragraph
Purpose and scope	1
Policy	2
Authorization	3
Procedures	4
Priorities	5
Aircraft support for Fort Belvoir	6
Responsibilities	7

1. Purpose and scope. a. This memorandum establishes procedures, priorities, and responsibilities for processing requests for Priority Air Transportation (PAT) using Army aircraft assigned to Davison U. S. Army Airfield, Fort Belvoir, Va.

b. Information concerning requests for special air missions using U. S. Air Force aircraft will be directed to the Commanding Officer, U. S. Army Service Center for the Armed Forces, Department of the Army, Washington 25, D. C.

c. Information concerning requests for aircraft for Combat Readiness Flights (CRF) by Army aviators assigned to activities within the geographic limits of the Military District of Washington, U. S. Army (MDW) is in DA Memo 95-1.

d. Fixed wing and rotary wing aircraft of various configurations are assigned to Davison U. S. Army Airfield for fulfillment of missions assigned to MDW. The requirements of these missions permit only a limited employment of assigned aircraft for PAT flights. For this reason PAT flights must be controlled on a daily basis dependent on overall mission requirements and aircraft availability.

2. Policy. So far as it pertains to PAT missions Department of Defense policy is that commercial transportation service be employed for movement of personnel and equipment when this service is available or readily obtainable and is satisfactorily capable of meeting military requirements. Therefore, requests for PAT missions will be made only when the mission is of such urgency or nature that

*This memorandum supersedes DA Memo 59-2, 14 February 1957, and so much of DA Memorandum 59-1, 11 February 1957, including C 1, 7 February 1958, as applies to SAM flights via U. S. Army aircraft.

Memo 59-2

regularly established modes of commercial or military transportation are not adequate to meet military requirements. Nonavailability of travel funds is not sufficient justification for requesting PAT missions.

3. Authorization. Transportation on PAT flights will be provided only for traffic authorized movement under AR 96-20. Personnel traveling on official business are required to be authorized by written orders to travel on military aircraft in accordance with AR 96-20. DA Form 622 (Request for and Authorization For Military Personnel TDY Travel and Civilian Personnel TDY and PCS Travel) is the preferred instrument of authorization for military and civilian personnel. For other than active duty military personnel, one copy of orders for each person concerned will be sent to the Commanding General, Military District of Washington, U. S. Army, ATTN: ANWAV no later than the workday preceding the date of the requested flight. When the mission does not allow sufficient time for compliance, one copy of orders will be provided to the pilot or Operations Officer, Davison U. S. Army Airfield before takeoff, and one copy will be sent as above no later than the second workday after completing the mission. Active duty military personnel traveling on either TDY or a space-available basis are exempt from the requirement of providing competent travel orders and in lieu thereof will have in their possession DA Form 662, leave or pass orders, or other adequate identification.

4. Procedures. a. Military aides will schedule White House flights direct with the Operations Officer, Davison U. S. Army Airfield. Other agencies in the Washington area requiring PAT flights by Army aircraft will direct requests to the Commanding General, MDW. The office of the MDW Aviation Officer is the processing center for PAT flights.

b. Requests will be sent by letter to the Commanding General, MDW, Washington 25, D. C., ATTN: ANWAV as required under any one or combination of the following conditions:

- (1) If passengers are to include other than active duty military or civil service personnel.
- (2) If the flight requires absence of the aircraft from Davison U. S. Army Airfield in excess of 60 hours.
- (3) If any point on the flight route exceeds 750 nautical miles from Washington, D. C.

c. Written requests, if required, will contain the following information:

- (1) Name of senior officer or official making the trip and, if available, name, grade (GS designation or equivalent), and service number of other passengers. When the names of passengers are not known when the request is submitted, the number of persons should be approximated and the names telephoned before the flight.
- (2) General nature and/or purpose of the trip.

Memo 59-2

- (3) Name of officer or official who recommends travel by Army aircraft. Reason for exception to Department of Defense policy as noted in paragraph 2 must be included.
 - (4) Itinerary of scheduled stops en route, to include dates and approximate times.
 - (5) Name and telephone number of individual in requesting agency who is responsible for final coordination.
 - d. Written requests will reach MDW not less than 3 nor more than 30 full workdays before the first day of the flight. When written requests are required and urgency precludes submission in advance of the flight, arrangements will be made by telephone.
 - e. When written requests for PAT flights are not required in accordance with b above, arrangements will be made by telephone direct with the Aviation Officer, MDW or his representative at OXFord 57187. Direct contact with Davison U. S. Army Airfield (SOUTH 5-7700 or code 192, ext. 25215) is authorized only during other than normal duty hours.
5. Priorities. The Commanding General, MDW is responsible for scheduling flights of aircraft assigned to Davison U. S. Army Airfield and will resolve scheduling conflicts according to the following priorities:
- a. First priority. Emergency or humanitarian missions and flights related to disaster or implementing emergency plans.
 - b. Second priority. Flights for the White House staff, general officers, and civilian officials or civil service personnel in grade GS-16 or higher sponsored by military establishments in the Washington area.
 - c. Third priority. PAT flights not included in first or second priorities, to include flights by Army aviators combining official business with combat readiness training.
 - d. Fourth priority. CRF in the order received and in accordance with DA Memo 95-1.
6. Aircraft support for Fort Belvoir. The Engineer Center, Fort Belvoir, Va. is included in the agencies authorized aircraft support by Davison U. S. Army Airfield. Requests will be filled in accordance with the above priorities except that aircraft requirements for scheduled instruction and tests for the Engineer School and Engineer Research and Development Laboratory will have precedence over third and fourth priority requests as established by paragraph 5. Arrangements for all Engineer Center flights will be channeled through G-3, Fort Belvoir to the MDW Aviation Officer.
7. Responsibilities. The Commanding General, MDW will--
- a. Review requests for and assign PAT flights utilizing Army aircraft, including revenue traffic flights in accordance with AR 59-30.
 - b. Initiate documentation in accord with applicable regulations relative to revenue traffic flights utilizing Davison U. S. Army Airfield aircraft.

Memo 59-2

- c. Schedule suitable aircraft for approved flights.
- d. Maintain records of PAT and revenue traffic flights accomplished in Army aircraft assigned to Davison U. S. Army Airfield to include--
 - (1) Written requests, if applicable.
 - (2) Copies of orders authorizing other than active duty military passengers or materiel to be transported by military aircraft.
 - (3) Record of action taken with respect to all requests.
- e. Report to the proper Department of the Army agency--
 - (1) Any significant trends in travel via PAT aircraft, to include recommended changes in aircraft and facilities required for projected intermediate and long-range operations.
 - (2) Instances of alleged misuse of Army aircraft or apparent violations of policy.

(AG 580 (8 Sep 59) OPS)

By Order of Wilber M. Brucker, Secretary of the Army:

L. L. LEMNITZER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Headquarters, Department of the Army
Military District of Washington, U. S. Army
Each Army aviator assigned in Military District
of Washington, U. S. Army

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ATTACHMENT 2

AVAILABILITY OF COMMERCIAL AIRCRAFT

1. Limited commercial helicopter service is available in the Washington area. General information is available on two firms:

- a. Washington-Baltimore Helicopter Airways, Inc.
817 Warner Building
Washington, D. C.

This firm operates Bell-type two-passenger aircraft. At present, this company has no landing authority at military installations in the Washington area but is negotiating for a landing site near the Pentagon on the Shirley Highway. Since commercial service to military installations requires extremely high insurance and since landing facilities in the downtown area at locations desired by the Agency are nonavailable, the Washington-Baltimore Helicopter Airways, Inc., is probably unsatisfactory at this time.

- b. Pilgrim Helicopter Service, Inc.
1401 K Street, N. W.
Washington, D. C.

This firm operates two-passenger helicopters similar to the Bell H-13. The company has adequate insurance and approval under FAA Operating Certificate 1-1051 to land at military or other Government agency installations within a radius of 150 miles of Washington, D. C. This airline has a helicopter port at 26th and G Streets, N. W., near Central Building. Examples of the services offered are as follows:

Pentagon Building to:

Bolling Air Force Base	5 minutes
Suitland, Maryland	9 minutes
Andrews Air Force Base	12 minutes
Fort George Meade	17 minutes
Fort Belvoir	10 minutes
Friendship Airport	24 minutes
New CIA Building	10 minutes
Germantown A. E. C.	25 minutes
Langley Air Force Base	1 hour and 40 minutes

TAB

ATTACHMENT 3

POTENTIAL LANDING SITES

1. Design and requirements for military heliports are specified in Figure 1, Appendix III, Change 3, to U. S. Army Engineering Manual 1110-3-311 dated 15 June 1957 (attached).

2. Helicopter flights to the Washington National Airport, Friendship National Airport, Baltimore, Andrews Air Force Base and Bolling Air Force Base may be made with prior arrangement with airport authorities. Additional potential landing sites for Agency use are:

a. New Headquarters Building - A suitable landing surface can be prepared as part of the auxiliary parking lot planned west of the building and scheduled for completion during March 1962. The 100 by 100 foot (load bearing capacity 15,000 lbs. per square foot) concrete pad specified in the cited engineering manual can be constructed at little or no additional cost, if accomplished at the same time that the remainder of the parking lot is paved. If construction of the landing pad is deferred until completion of the parking lot or is located in an unprepared area requiring grading, the cost will be approximately \$12,000. Even though the decision is made not to establish an Agency helicopter service immediately, the landing pad should be constructed for possible future use. If no requirement develops, the landing area can be used for the original purpose of parking cars. If the landing pad is used for helicopter operations, the capacity of the parking lot will be reduced by approximately 100 cars.

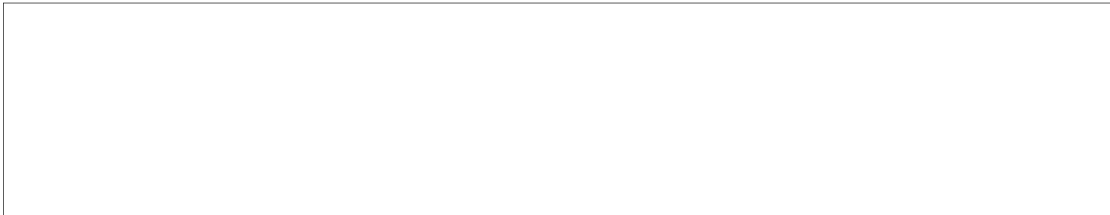
Note: The roof of the new CIA headquarters building is not suitable for a heliport since the roof is stressed for only 40 lbs. per square foot loading.

b. The White House - The area bounded on the west by the Potomac River, on the south by Independence Avenue, on the east by First Street, S. E. and on the north by K Street, N. W., is a prohibited area and only special flights to the White House and to one or two other locations (none close to the Tidal Basin) are presently permitted. Only aircraft of the Executive Helicopter Company, Davison Army Air Field, are permitted to land at the White House. Requests for landing clearance at the White House are referred to the President's Naval Aide. With rare exceptions, the helicopter landing privilege at the White House has been reserved for the President only. Historically, requests from other Government agencies for helicopter landing clearance have been denied.

SECRET

c. Potomac Park (Soccer Field on Ohio Drive) - Occasional landings may be feasible without surface preparation but continued use requires a concrete pad. Use of a grassed area for landings for approximately three consecutive days destroys grass cover creating a dust hazard. Possible use of this site has not been cleared with the Director of the National Park Service.

d. The Hill Area (Administration Building) - The heliport at 26th and G Streets utilized by the Pilgrim Helicopter Service, Inc., is the only prepared site near this location. The roof of the new State Department building was designed to support a heliport. Coordination with the Chief, Building Management Division, State Department, determined that completion of the roof heliport is being held in abeyance for an undetermined length of time.



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THESE PAGES 3, 4, 5, and 6; APPENDIX I, 3, 4, 5, and 6; APPENDIX II, 1, 2, 3, 4, 5, and 6; and APPENDIX III, 1, 2, and FIGURE 1, CONSTITUTE CHANGE 3 to EM 1110-3-311, 15 Jun 57.

EM 1110-3-311

Change 3

30 Jun 59

instrument checks to assure proper engine performance prior to takeoff.

- i. Mass Parking Aprons (Airfields and Heliports). Mass parking aprons are paved areas required for the parking, loading, unloading, maneuvering, and servicing of aircraft.
 - j. Hangar Access Aprons (Airfields and Heliports). Hangar access aprons are paved areas connecting the hangar aircraft entrances with adjacent aircraft taxiways, parking aprons, and hardstand areas.
 - k. Dispersed Hardstand Areas. Dispersed hardstand areas are used to park transport helicopters. Configuration of these hardstand areas will conform to layout shown on Figure 3 to Appendix II.
 - l. Aircraft Washing Areas. Aircraft washing areas are paved and drained areas sited adjacent to a hangar building and are equipped with all the necessary appurtenances for washing and cleaning aircraft.
 - m. Subgrade. Subgrade applies to the natural soil in place or to fill material upon which a pavement, base, or subbase course is constructed.
 - n. Compacted Subgrade. Compacted subgrade applies to the upper part of the subgrade, which is compacted to a density greater than the portion of the subgrade below.
 - o. Base or Subbase. Base and subbase courses, or combined courses, consist of natural materials or processed materials placed on the subgrade beneath the pavement.
 - p. Pavement. The term "pavement" is defined as a surface of prepared or manufactured product superimposed upon the base or subgrade either as a structural member or as a weather- and abrasive-resisting medium.
 - q. Overlay Pavement. Overlay pavement is pavement superimposed on existing pavement, or existing pavement and base, to reinforce the load carrying capacity.
4. Design and Selection of Pavements for Army Airfields and Heliports.
- *a. All pavements subject to aircraft traffic at Army airfields will be designed for 22,000-lb load on single wheel gear with 100 p.s.i. tire pressure.

EM 1110-3-311

Change 3

30 Jun 59

(1) The following paved areas at Army airfields will be designed for rigid pavement only:

- (a) Parking, maintenance, and access aprons.
- (b) Aircraft washing areas.
- (c) Compass swinging bases.
- (d) Hangar floors.

(2) All other pavements subject to aircraft traffic will be designed for both rigid and flexible pavement. Selection of pavement type to be constructed will be based on least first cost.*

*b. All pavements planned for and subject to HW aircraft traffic only at Army heliports will be designed for 15,000-lb. load on twin wheels spaced 20" c. to c., 100 sq. in. contact area each wheel.

(1) The following paved areas at Army heliports will be designed for rigid pavement only:

- (a) Parking, maintenance, and access aprons.
- (b) Hardstands. (Taxilanes and taxiways not included.)
- (c) Aircraft washing areas.
- (d) Compass swinging bases.
- (e) Hangar floors.

(2) All other pavements subject to aircraft traffic will be designed for both rigid and flexible pavement. Selection of pavement type to be constructed will be based on least first cost.*

c. When rigid pavement is to be constructed, the minimum thickness of the portland cement concrete will be 6 inches. Where flexible pavement is to be constructed, the asphaltic concrete mix design will be based on current high pressure tire (75 blow) criteria.

*d. Exceptions to Design Loadings and Pavement Type.

(1) Special consideration must be given to design of pavements for primary training, missile support and other special mission airfields and heliports, and helicopter landing pads. Pavements for these special use installations should be designed to support the planned operations of the more critical using aircraft. When this results in a design load of less than

EM 1110-3-311

Change 3

30 Jun 59

10,000 pounds on a single wheel gear, 100 p.s.i. tire pressure, the proposed design will be forwarded to the Chief of Engineers, Attention: ENGER for approval.

(2) Where reduced operational requirements warrant consideration of least cost pavement in hardstand and apron areas, justification will be forwarded to the Chief of Engineers, Attention: ENGER, for approval.*

5. Evaluation of Army Airfield and Heliport Pavements. Evaluation of Army airfield and heliport pavements will be prepared in accordance with the current Army and Air Force Evaluation Manual.

6. Grade Control and Surface Smoothness for Army Airfield and Heliport Pavements. Grade control and surface smoothness requirements for Army airfield and heliport pavements will be in accordance with current OCE guide specifications for traffic and nontraffic areas of airfield pavements.

7. Drainage. Drainage design of airfield and heliport paved areas will be in accordance with EM 1110-345-281, EM 1110-345-282, and EM 1110-345-283 (Chapters 1 through 3 of Part XIII, Engineering Manual.)

8. Criteria for Permanent Army Airfields. The criteria specified in Appendix I, "Criteria for Permanent Army Airfields," with Figure 1 pertain to dimensional and other requirements for Army-airfield fixed-wing facilities.

9. Criteria for Permanent Army Heliports. The criteria specified in Appendix II, "Criteria for Permanent Army Heliports," with Figures 1, 2, 3, and 4 pertain to dimensional and other requirements for transport helicopter facilities.

10. Criteria for Permanent Army Helicopter Landing Pad. The criteria specified in Appendix III, "Tabulation of Criteria for Permanent Army Helicopter Landing Pad," with Figure 1 pertain to the dimensional and other requirements for Army helicopter landing pads.

11. Determination of Fixed-Wing Mass Parking Aprons at Army Airfields. The criteria specified in Appendix IV, "Criteria for Determining Dimensions of Mass Parking Aprons at Army Airfields," with Table I and Figures 1 and 2 establish the factors and requirements to be considered in determining mass parking aprons at Army airfield installations.

12. Navigable Airspace and Airfield Clearances at Army Airfields. The criteria specified in Appendix V, "Criteria for Determining Navigable Airspace at Army Airfields," with Figures 1 and 2 define and establish criteria for determining navigable airspace and clearances at Army airfield installations.

EM 1110-3-311

Change 3

30 Jun 59

13. Navigable Airspace and Clearances at Army Airfield-Heliports.
The criteria specified in Appendix VI, "Criteria for Determining Navigable Airspace and Clearances at Army Airfield-Heliports," with Figure 1 define and establish criteria for determining navigable airspace and clearances at Army airfield-heliport installations.

FOR THE CHIEF OF ENGINEERS:

6 Appendixes

I - Criteria for Permanent
Army Airfields

II - Criteria for Permanent
Army Heliports

III - Tabulation of Criteria for
Permanent Army Helicopter Landing Pad

IV - Criteria for Determining dimensions of
Mass Parking Aprons at Army Airfields

V - Criteria for Determining Navigable Airspace
and Clearances at Army Airfields

VI - Criteria for Determining Navigable Airspace
and Clearances at Army Airfield-Heliports

W. P. LEBER

Colonel, Corps of Engineers
Executive

EM 1110-3-311

APP I

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
*7	Transverse grade of runways	Minimum 0.5% Maximum 1.0%	
8	Transverse grade of shoulders	Minimum 2.0% Maximum 3.0%	Shoulder will slope away from runway.
9	Parallel runways (minimum clearance between center-line of runways)	750 ft.	
10	Cleared areas Maximum slope	10%	Width of cleared areas depends on runway width involved. Lateral cleared zones are the areas located between the runway shoulders and the clearance lines limiting the placement of building construction and other obstacles with respect to the runway centerline. These areas will be rough-graded to the extent necessary to reduce damage to aircraft in the event of erratic performance.
<u>TAXIWAYS</u>			
11	Width	50 ft.	
*12	Shoulder width	Minimum 25 ft.	*Shoulder treatment will be the same as indicated in Item No. 3 for Runways.*

EM 1110-3-311

APP I

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
*13	Clearance from *taxiway centerline to fixed and/or movable obstacle	125 ft.	For definition of fixed or movable obstacles, see remarks for item 4 above.
14	Longitudinal grades of taxiways and shoulders	Maximum 2.0%	
15	Transverse grade of taxiways	Minimum 0.5% Maximum 1.5%	
16	Transverse grades of taxiway shoulders	Minimum 2.0% Maximum 3.0%	Same as remarks for item 8
*17	Grade in any direction in taxiway cleared areas	Maximum 5.0%	Lateral cleared areas are the areas located between the taxiway shoulders and the clearance lines limiting the placement of buildings, construction, and other obstacles with respect to the taxiway centerline. These areas will be rough-graded to the extent necessary to reduce damage to aircraft in the event of erratic performance.
18	Taxiway horizontal curves - minimum radius to near edge of taxiway	150 ft.	These curved taxiways are normally located where parallel taxiways to runways intersect connecting taxiway at ends of runways.
19	Fillet of pavement junction - minimum radius	25 ft.	

APP I
Change 3
30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
<u>APRONS</u>			
20	Fillet of pavement junctions - Minimum radius	25 ft.	
*21	Apron shoulder width	Minimum 25 ft.	*Shoulders will be designed to sustain traffic of support vehicles. Design thickness will be that required for an 8,000-lb load on single wheel, 100 p.s.i. A double bituminous surface treatment placed on a base of min. 6 in. thickness and of min. CBR of 40 will be used.*
22	Transverse grade of apron shoulder	Minimum 2.0% Maximum 3.0%	Same as remarks, item 8.
23	Lateral clearance from rear and sides of aprons to fixed or movable objects.	75 ft.	For definition of fixed or movable objects, see remarks for item 4 above.
24	Grade (any direction)	Minimum 0.5% Maximum 1.5%	Pavement gradients exceeding the minimum specified are intended for those areas where design of expansive pavements to accommodate unusual runoff dictates such a requirement. Economic factors imposed by difficult terrain features may also require the use of steeper gradients. Arbitrary utilization of gradients in excess of actual or reasonable requirements is not within the intent herein. For example, in designing so-called "sawtooth" surface drainage patterns, extreme care must be exercised to prevent the utilization of steep grades or rapid grade changes at relatively

EM 1110-3-311

APP I

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
			short intervals. Such surface irregularities aggravate normal flexing of aircraft wing while taxiing and may result in damage to low underslung appurtenances on the aircraft.
25	Area required for mass parking apron	Determine in accordance with Appendix IV, this EM	Unless otherwise specified.
<u>ENGINE RUNUP AREA</u>			
26	Length	100 ft.	See Figure 1.
27	Width	155 ft.	See Figure 1.
28	Engine runup area grades, any direction	Minimum 0.5% Maximum 1.5%	
29	Shoulder width	Minimum 25 ft.	Shoulder treatment will be the same as indicated in item 12 for taxiways.
30	Transverse grade of shoulders	Minimum 2.0% Maximum 3.0%	
<u>OVERRUN</u>			
31	Length	500 ft.	Overrun and shoulders treatment, same as remarks for item 3.
32	Width	125 ft.	Width of runway plus shoulders.
33	Longitudinal grade	Maximum 1.5%	
34	Transverse grade	Minimum 2.0% Maximum 3.0%	

APP II
Change 3
30 Jun 59

APPENDIX II

CRITERIA FOR PERMANENT ARMY HELIPORTS

Item No.	Description	Dimensional or Other Requirements	Remarks
<u>RUNWAYS</u>			
1	Length	525 ft.	Increase by 10% for each 1,000 ft. in altitude above 2,000 ft. Add temperature correction of 4% for each 10°F. Increase above 59°F. in mean temperature for the warmest period during which operations will be conducted.
2	Width	75 ft.	Unless otherwise specified.
3	Longitudinal grades of runways and shoulders	Maximum 1.0%	Grading requirements are dictated by the operational limitations of the aircraft, the need for adequate surface drainage, and the necessity for exercising economy measures in the development of a heliport site. Consistent with these factors and in consequence of the fact that the runway lengths are computed on the basis of generally level pavements, longitudinal sloping of runways will be held to the minimum possible. Grades of edges of runways and shoulders of runway and taxiway intersections will be held to a minimum.
4	Transverse grade of runway	Minimum 0.5% Maximum 1.5%	Not mandatory at runway intersections.
*5.	Shoulder width	Minimum 25 ft.	*These areas are provided for emergency use of aircraft and for dust and erosion control. Shoulder areas will be compacted to a minimum of 90 per cent of modified AASHO maximum density. Stabilization for dust and erosion control will be adequate

EM 1110-3-311

APP II

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
			for prevention of displacement of shoulder materials by blast of rotorblades. Vegetative cover, anchored mulch, coarse-graded aggregate, liquid palliatives or a double bituminous surface treatment may be used. A base course of 4-inch thickness of CBR 40+ material will be used when double bituminous surface treatment is specified.*
6	Transverse grade of shoulders	Minimum 2.0% Maximum 3.0%	Shoulders will slope away from runway.
7	Clearance from runway centerline to fixed and/or movable obstacles.	125 ft.	Fixed obstacles include buildings, trees, rocks, terrain irregularities, and any other feature constituting a possible hazard to moving aircraft. Movable obstacles include moving and parked aircraft, vehicles, railroad cars, and so forth. The prescribed clearances apply with equal force to aprons, hardstands, parallel taxiways, roads, highways, railroad tracks, drainage headwalls, and drainage ditches.
8	Parallel runways (minimum clearance between centerlines of runways)	300 ft.	
#9	Cleared areas slope	Maximum 5.0%	Width of cleared areas depends on runway width involved. Lateral cleared zones are the areas located between the runway shoulders and the lateral clearance lines limiting the placement of building construction and other obstacles with respect to the runway centerline. These areas will be rough-graded to the extent necessary to reduce damage to aircraft in the event of erratic

EM 1110-3-311

APP II

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
			performance.
*10	Minimum sight distances	*525 ft.	Any two points 5 ft. above pavements must be mutually visible for distance indicated.
<u>TAXIWAYS</u>			
11	Width	50 ft.	
12	Longitudinal grades of taxiways and shoulders	Maximum 2.0%	
13	Transverse grade of taxiway	Minimum 0.5% Maximum 1.5%	
14	Shoulder width	Minimum 25 ft.	Same as for Item No. 5.
15	Transverse grades of taxiway shoulders	Minimum 2.0% Maximum 3.0%	Same as remarks for item 6.
16	Clearance from taxiway *centerline to fixed and/or movable obstacles.	125 ft.	For definition of fixed or movable obstacle, see remarks for item 7 above.
*17	Grade in any direction in taxiway cleared area	Maximum 5.0%	Lateral cleared areas are the areas located between the taxiway shoulders and the clearance lines limiting the placement of building construction and other obstacles with respect to the taxiway shoulder edge. These areas will be rough-graded to the extent necessary to reduce damage to aircraft in the event of erratic performance.

EM 1110-3-311

APP II

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
<u>HARDSTAND AND APRONS</u>			
18	Fillet of pavement junction - minimum radius	25 ft.	Omit fillets at hardstand entrances. (See Figure 3.)
19	Dimensions of individual hardstands:		
	Width	60 ft. 100 ft.	Light transport helicopters Medium transport helicopters
	Length	125 ft. 175 ft.	Light transport helicopters Medium transport helicopters
20	Mass parking aprons, dispersed hardstands, and access aprons.	Mass parking apron requirements for reconnaissance, utility, or transport helicopter units of less than company size will be determined in accordance with requirements specified on Figure 4. Dispersed parking facilities will be in accordance with Figure 3.	Unless otherwise specified.
21	Taxilanes width	40 ft. 50 ft.	Light transport helicopters Medium transport helicopters
*22	Hardstand and apron shoulder width	Minimum 25 ft.	*Shoulders will be designed to sustain traffic of support vehicles. Design thickness will be that required for an 8,000-lb load on single wheel, 100 p.s.i. A double bituminous surface treatment placed on a base of min. 6-in. thickness and of min. CBR or 4C will be used.*

EM 1110-3-311

APP II

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
23	Hardstand and apron grade (in any direction)	Minimum 0.5% Maximum 1.5%	Pavement gradients exceeding minimum specified are intended for those areas where design of expansive pavement to accommodate unusual runoff dictates such a requirement. Economic factors imposed by difficult terrain features may also require the use of steeper gradients. Arbitrary utilization of gradients in excess of actual or reasonable requirements is not within the intent herein. For example, in designing so-called "sawtooth" surface drainage patterns, extreme care must be exercised to prevent the utilization of steep grades or rapid grade changes at relatively short intervals. Such surface irregularities aggravate normal flexing of aircraft blades while taxiing and may result in damage to the aircraft.
24	Transverse grade of hardstand and apron shoulders	Minimum 2.0% Maximum 3.0%	Same as remarks for item 6.
25	Lateral clearance from rear and sides of apron and hardstand areas to fixed or movable objects*	75 ft.	For definition of fixed or movable objects, see remarks for item 7.
<u>ENGINE RUNUP AREA</u>			
26	Length	290 ft.	See Figure 2.
27	Width	290 ft.	See Figure 2.
28	Grades in any direction	Minimum 0.5% Maximum 1.5%	

EM 1110-3-311

APP II

Change 3

30 Jun 59

Item No.	Description	Dimensional or Other Requirements	Remarks
29	Shoulders	Minimum 25 ft.	Same as remarks for item 5.
30	Transverse grade of shoulders	Minimum 2.0% Maximum 3.0%	
<u>OVERRUN</u>			
31	Length	Minimum 100 ft.	Design of overrun same as for runway shoulders in remarks for item 5.
32	Width	125 ft.	Width of runway plus shoulders.
33	Longitudinal grade	Maximum 1.0%	Overrun longitudinal grade should have the same grade as the runway.
34	Transverse grade	Minimum 2.0% Maximum 3.0%	
<u>CLEAR ZONE</u>			
35	Length	100 ft	
36	Width	250 ft	
*37	Grades outside of overrun and shoulders	Maximum 5.0%	
<u>APPROACH ZONE</u>			
<u>Instrument and Non-Instrument</u>			
38	Glide angle ratio	1:20	Glide angle ratio from outer end of clear zone
39	Length	3,000 ft.	
40	Widths		
	At end of clear zone	250 ft.	
	At outer end	1,000 ft.	

1110-3-311
 APP III
 Change 3
 30 Jun 59

APPENDIX III

 TABULATION OF CRITERIA FOR PERMANENT
 ARMY HELICOPTER LANDING PAD

<u>LANDING PAD</u>			
<u>Item No.</u>	<u>Description</u>	<u>Dimensional or Other Requirements</u>	<u>Remarks</u>
1.	Length	100 ft.	Unless otherwise specified.
2.	Width	100 ft.	Unless otherwise specified.
3.	Landing Pad, grade in one direction	Minimum 0.5% Maximum 1.0%	Grade of pad will be all in one direction.
*4.	Landing Pad shoulder width	25 ft.	*These areas are provided for emergency use of aircraft and for dust and erosion control. Shoulder areas will be compacted to a minimum of 90 per cent of modified AASHO maximum density. Stabilization for dust and erosion control will be adequate for prevention of displacement of shoulder materials by blast of rotor-blades. Vegetative cover, anchored mulch, coarse-graded aggregate, liquid palliatives or a double bituminous surface treatment may be used. A base course of 4-inch thickness of CBR 40+ material will be used when double bituminous surface treatment is specified.*
5.	Longitudinal grade of shoulder	Same as Landing Pad	
6.	Transverse grade of shoulder	Minimum 2.0% Maximum 3.0%	Shoulders will slope away from the landing pad
7.	Clearance requirements from 3 sides of Landing Pad	Clear zone and approach zone criteria	See Items 10 thru 15 and Figure 1
8.	Clearance from 1 side of Landing Pad to fixed and/or Movable obstacles	75 ft.	See Figure 1

EM 1110-3-311

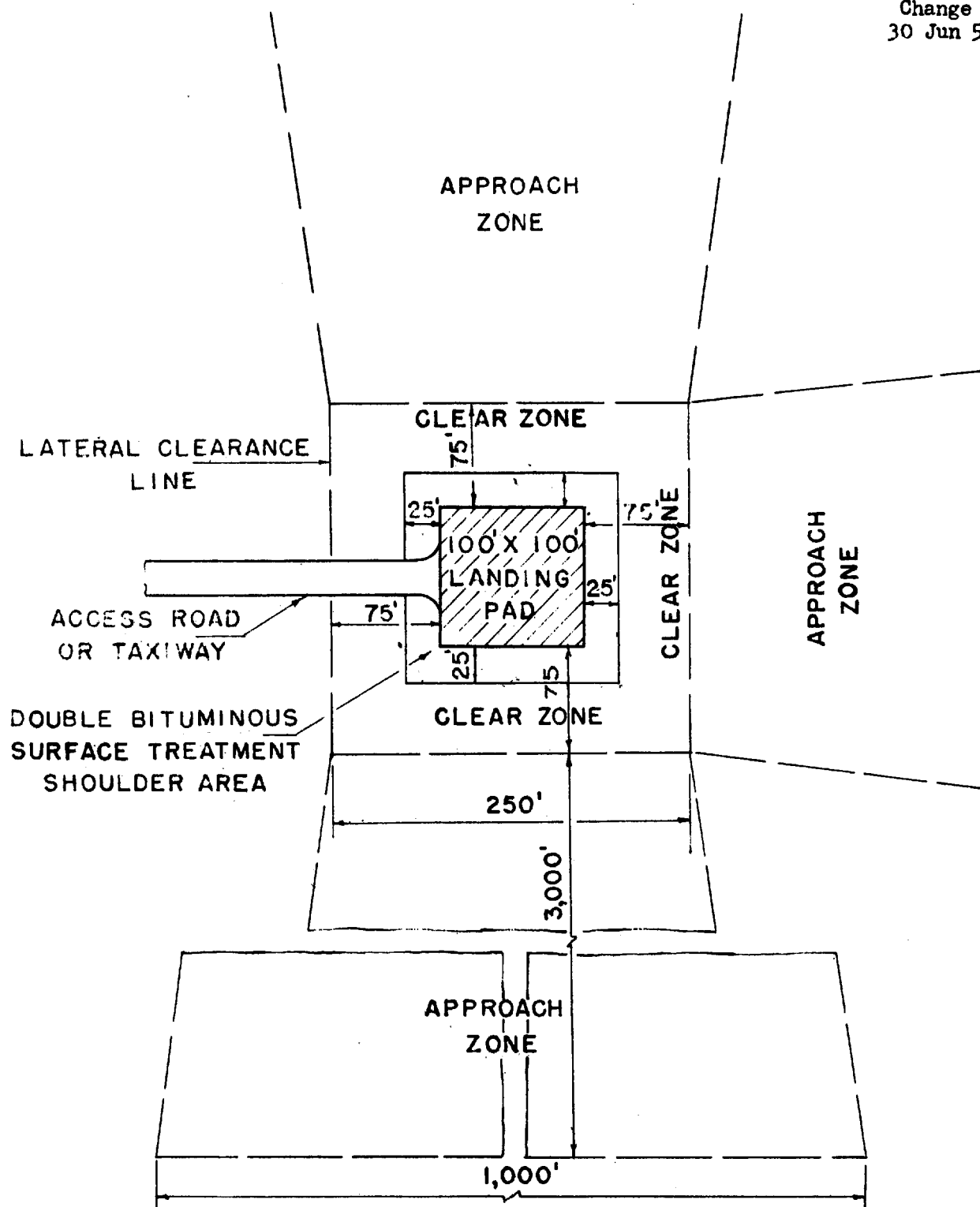
APP III

Change 3

30 Jun 59

<u>Item No.</u>	<u>Description</u>	<u>Dimensional or Other Requirements</u>	<u>Remarks</u>
*9.	Grades outside of shoulder areas to limits of clear zone and lateral clearance line.	Maximum 3.0%	
<u>CLEAR ZONE</u>			
10.	Length	75 ft.	
11.	Width	250 ft.	
*12.	Grades outside of shoulder area to limits of clear zone	Maximum 3.0%	
<u>APPROACH ZONE</u>			
13.	Glide-angle ratio	1:20	Glide-angle ratio from outer end of clear zone at same elevation of Landing-field edge.
14.	Length	3,000 ft.	
15.	Widths		
	At end of clear zone	250 ft.	
	At outer end	1,000 ft.	

APP III
Change 3
30 Jun 59



TYPICAL LAYOUT OF A HELICOPTER
LANDING PAD

FIGURE 1

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TAB

ATTACHMENT 4

COMPARATIVE CUSTOMER COSTS

<u>Type of Aircraft</u>	<u>Costs Assessed by Military Services per Hour</u>	<u>Costs of Commercial Service per Hour</u>
H-13-H, made by Bell, carries 1 crew member and 2 passengers, or 1 crew member and 400 lbs. of cargo.	\$ 45.00	\$ 66.00
H-23-D, by Bell, carries 1 crew member and 2 passengers, or 1 crew member and 700 lbs. of cargo.	\$ 55.00 to \$ 75.00	Not available commercially
H-34-A, by Sikorsky, carries 2 crew members and 18 passengers, or 2 crew members and 4,000 lbs. of cargo.	\$140.00 to \$180.00	Not available commercially